Trabajo Final de Grado Arquitectura Técnica

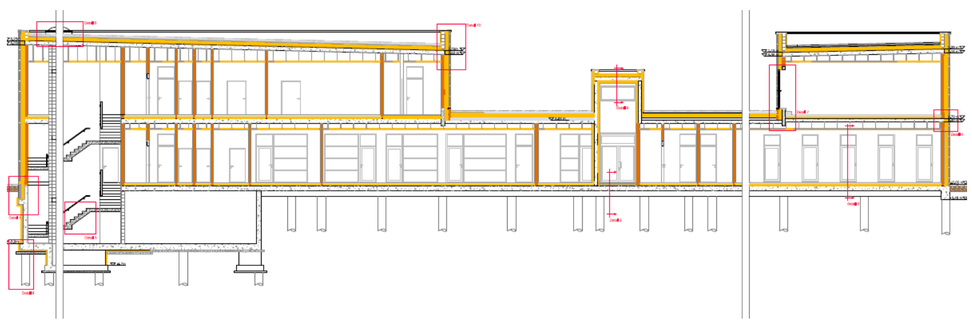
modalidad de intercambio académico curso 2013-2014

BÉLGICA / BELGIUM – Aalst

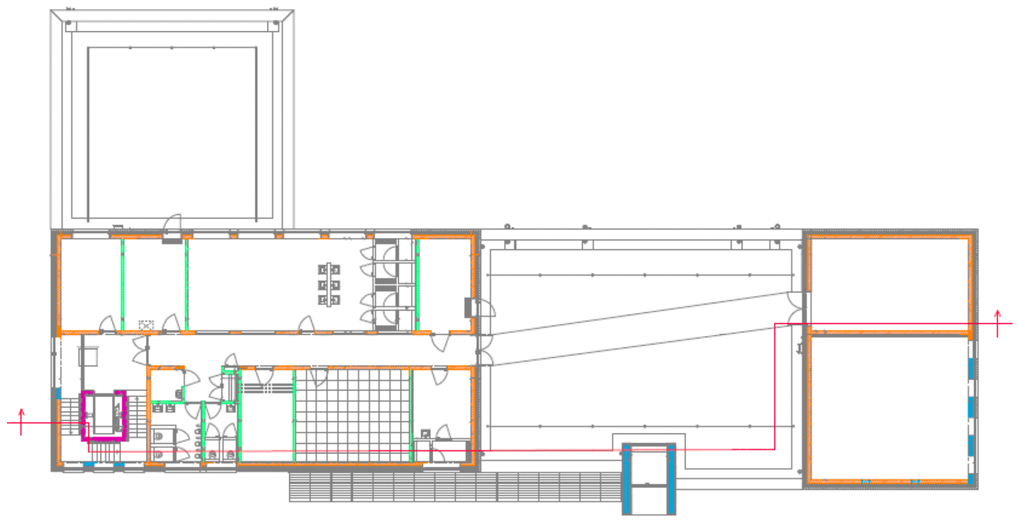
Construcción de un edificio administrativo en Kluizen, Bélgica
Construction of an administrative building in Kluizen, Belgium

La obra consta de sótano, planta baja y primera. Como cimentación se utilizan pilotes en todo el edificio. En el sótano se utilizan muros de cimentación y vigas de hormigón armado in situ. La estructura del resto del edifico son vigas de hormigón armado in situ y muros de termoarcilla, así como algunos pilares de hormigón prefabricado. Las escaleras se componen de 6 tramos de hormigón prefabricado, colocados alrededor del hueco del ascensor, cubierto con bloques de hormigón.

The construction consists on a basement, ground floor and first floor. Foundations are made by piles in the whole building. Wall foundations with beams, both made of in situ concrete, are used in the basement. The rest of the building is supported by in situ concrete beams, brickworks and prefabricated concrete columns. Stairs consist of 6 parts of prefabricated steps, going around the elevator, which is covered by concrete blocks walls.

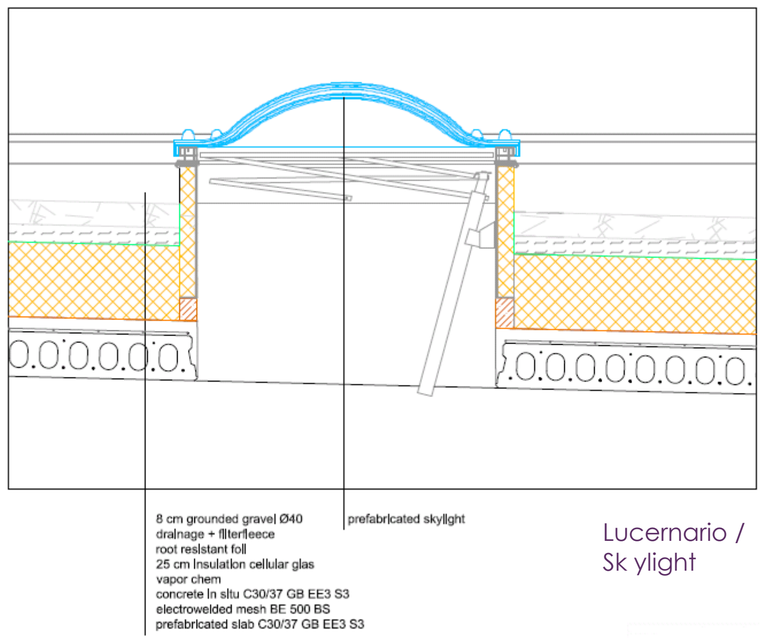


Sección principal / Principal section

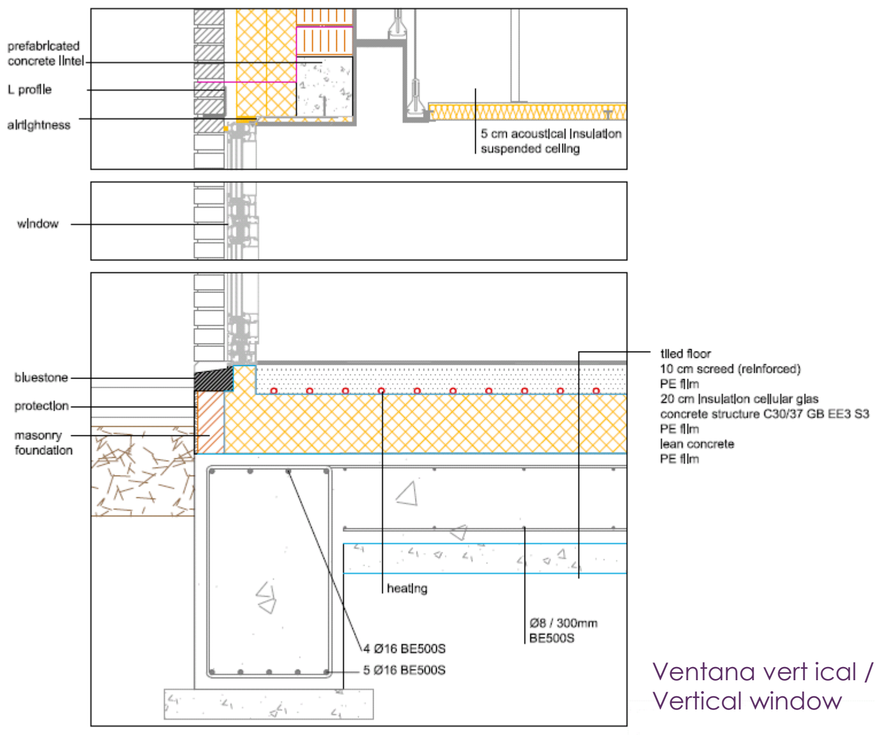


Primera planta / First floor

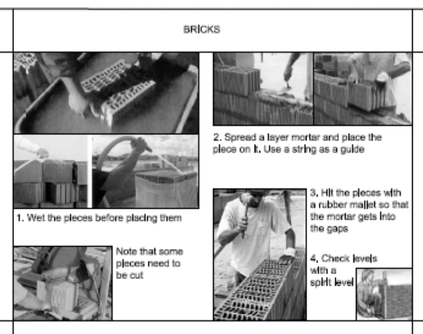
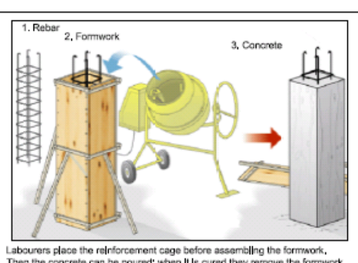
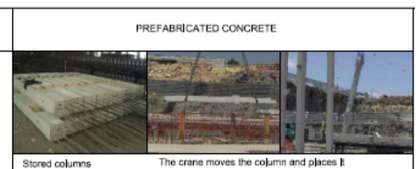
Planta baja / Ground floor



Lucernario / Sk ylight



Ventana vert ical / Vertical window

COLUMNS 2.80 x 1.00 m	BRICKS	IN SITU CONCRETE	PREFABRICATED CONCRETE
IMPLEMENTATION	 1. Wet the pieces before placing them. 2. Spread a layer mortar and place the piece on it. Use a string as a guide. 3. Hit the pieces with a rubber mallet so that the mortar gets into the gaps. 4. Check levels with a spirit level. Note that some pieces need to be cut	 1. Rebar 2. Formwork 3. Concrete. Labourers place the reinforcement cage before assembling the formwork. Then the concrete can be poured; when it is cured they remove the formwork.	 Stored columns. The crane moves the column and places it. Labourers place the column in the exact position and fix it with bolts and nuts
MATERIALS	Bricks Mortar	Reinforcement cage Concrete	Prefabricated columns Bolts and nuts
EQUIPMENT	String or line Line pins Spirit level and plumb rule Brick trowel Scaffold	Spacers Formwork Truck mixer Plumb Scaffold Crane with cupola Concrete pump Vibrator	Tower crane
EFFICIENCY	Labourer_0,4h/m²	Labourer_0,285h/m³	Labourer_0,25h/unit
TOTAL DURATION PER FLOOR (18 CLUMNS)	Labourer_0,4h/m² · 2,8m² = 1,12h · 18 = 20,16h	Labourer_0,285h/m³ · 0,532m³ = 0,15162h + waiting days until the concrete gets cured	0,25h
COST	Bricks_0,95€/u · 56 = 53,2€ Mortar_133,3€/m³ · 0,5225m³ = 69,65 € Labourer_17,24€/h · 0,4h = 6,9€ TOTAL/COLUMN = 129,75€ TOTAL = 2 335,5€	Spacer_0,06€/u · 12 = 0,72€ Reinforcement cage_120kg · 1€/kg = 120€ Formwork (10 times)_10,60€/m² · 16m² = 169,6€ / 10 = 16,9€ Concrete_76,88€/m³ · 2,8m³ = 215,264 € Labourer_18,10€/h · 0,151 6h = 2,74€ TOTAL/COLUMN = 355,624€ TOTAL = 6 401,232€	Prefabricated columns_471€/unit Labourer_18,10€/h · 0,252€ = 4,56€ Labourer help_18,94€/h · 0,252€ = 4,26€ Crane driver_66,84€/h · 0,25h = 16,71€ TOTAL/COLUMN = 496,55€ TOTAL = 8 937,9€
PROS / CONS	PROS Manufacturing Cheap materials Easy construction method CONS Less resistence Need to check levels	PROS Manufacturing Proper resistance Good quality materials CONS Time Concrete comes from manufacture Waiting days until concrete gets cured	PROS High quality materials Reduction in execution time Sections with greater resistance CONS Handling and transport Manufacturing
CONCLUSION	According to the data above, the brick column is the cheapest one, but it could cause some resistence problems, so it should be discarded.	The materials needen for the in situ concrete column can be reached easily, although it has waiting times, it is a good option since it is properly resistant.	The main problem of the prefabricated elements is the existance of a manufacturer on the nearby to the building site, if it is, then this is the best option, because its high price is offset by the short execution time and its resistance

Estudio comparativo / comparative study

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors
1		START	646 days	Mon 12/08/13	Mon 01/02/16	
2		1. Dewatering	130 days	Mon 12/08/13	Fri 07/02/14	
3		2. Dig	11 days	Wed 21/08/13	Wed 04/09/13	2SS+7 days
4		3. Pile foundations	18 days	Wed 21/08/13	Fri 13/09/13	2SS+7 days
5		4. Lift pit	12 days	Mon 10/02/14	Tue 25/02/14	2;4
6		**5. Basememt**	**30 days**	**Wed 26/02/14**	**Tue 08/04/14**	
7		5.1. Slab	9 days	Wed 26/02/14	Mon 10/03/14	5
8		5.2. Walls	21 days	Tue 11/03/14	Tue 08/04/14	7
9		**6. Ground floor**	**30 days**	**Wed 09/04/14**	**Tue 20/05/14**	
10		6.1. Floor	10 days	Wed 09/04/14	Tue 22/04/14	8
11		6.2. Prefab staircase	1 day	Wed 23/04/14	Wed 23/04/14	10
12		6.3. Prefab elements	2 days	Thu 24/04/14	Fri 25/04/14	11
13		6.4. Brickworks	15 days	Mon 28/04/14	Fri 16/05/14	12
14		6.5. Prefab lintels	2 days	Mon 19/05/14	Tue 20/05/14	13
15		**7. First floor**	**20 days**	**Wed 21/05/14**	**Tue 17/06/14**	
16		7.1. Floor	5 days	Wed 21/05/14	Tue 27/05/14	14
17		7.2. Prefab staircase	1 day	Wed 28/05/14	Wed 28/05/14	16
18		7.3. Prefab elements	2 days	Thu 29/05/14	Fri 30/05/14	17
19		7.4. Brickworks	10 days	Mon 02/06/14	Fri 13/06/14	18
20		7.5. Prefab lintels	2 days	Mon 16/06/14	Tue 17/06/14	19
21		**8. Roof**	**20 days**	**Wed 18/06/14**	**Tue 15/07/14**	
22		8.1. Floor	5 days	Wed 18/06/14	Tue 24/06/14	20
23		8.2. Ledge	10 days	Wed 25/06/14	Tue 08/07/14	22
24		8.3. Finishings	5 days	Wed 09/07/14	Tue 15/07/14	23
25		9. Parament	74 days	Wed 30/04/14	Mon 11/08/14	9SS+15 days
26		10. Installations	27 days	Mon 16/06/14	Tue 22/07/14	19;25SS+1 day
27		11. Exteral joinery	41 days	Mon 23/06/14	Mon 18/08/14	25SS+38 days
28		12. Finishings	104 days	Tue 19/08/14	Fri 09/01/15	26;27
29		END	1 day	Mon 12/01/15	Mon 12/01/15	28;24

Lista de actividades / Activities list

Alumno: **B**arbara **C**OTANDA **B**RELL

tutor destino: **B**art **C**RAEYE

tutor ETSIE: **M**ª **J**osé **V**IDAL **L**UCAS

KAHO Sint-Lieven

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